Amendments to the Specification:

Please replace the paragraph beginning at page 10, line 5, with the following rewritten paragraph:

It should be understood that the present invention does not exclude the situation in which the illumination chamber **103** and the reaction chamber **105** of the reaction cell are partially or fully overlapping each other. FIG. 1C ~~illustrates~~ schematically illustrates a reactor system having a reaction cell that accommodates light illumination and chemical/biochemical reaction in one chamber **143**. Such an overlapping scheme is preferred in certain circumstances when, for example, the overlapping allows simpler and/or cheaper reactor devices to be fabricated. In embodiments having a full overlap, the term reaction cell and reaction chamber can be used interchangeably as there is a single combined chamber.

Please replace the paragraph beginning at page 13, line 12, with the following rewritten paragraph:

FIG. 3A illustrates an exploded perspective view of a flowthrough multi-cell reactor device, a preferred embodiment of the present invention. In this device, a microfluidic template **310** is sandwiched between a first window plate **351** and a second window plate **361.** Preferably, the microfluidic template **310** is made of silicon when reaction cells are small. In this case, the preferred distance between adjacent reaction cells is in the range of 10 to 5,000 μm. More preferably, the distance is in the range of 10 to 2,000 μm. Yet more preferably, the distance is in the range of 10 to 500 μm. Even more preferably, the distance is in the range of 10 to 200 μm. The silicon microfluidic template **310** is formed using etching processes which are well ~~know~~ known to those skilled in the art of semiconductor processes and microfabrication (Madou, M., *Fundamentals of Microfabrication, CRC* Press, New York, (1997)). The top surface **313** of the microfluidic template **310** is preferably coated with silicon dioxide, which can be made by either oxidation or evaporation during a fabrication process. When the reaction cells are large, e.g. the distance between adjacent reaction cells is larger than 5,000 μm, plastic materials are preferred. Plastic materials may also be preferred for large quantity production of the multi-cell reactor device even when the distance between adjacent reaction cells is less than 5.000 μm. Preferred

plastics include but are not limited to polyethylene, polypropylene, polyvinylidine fluoride, and polytetrafluoroethylene. The plastic microfluidic template **310** can be made using molding methods, which are well know to those skilled in the art of plastic processing. In one aspect of the present invention, the first window plate **351** and the second window plate **361** are preferably made of transparent glass and are bonded with the microfluidic template **310**. In another aspect of the present invention, the first window plate **351** and the second window plate **361** are preferably made of transparent plastics including but not limited to polystyrene, acrylic, and polycarbonate, which have the advantage of low cost and easy ~~handing~~ handling.

Please replace the paragraph beginning at page 14, line 6, with the following rewritten paragraph:

The microfluidic device shown in FIG. 3A embodies the two-level device configuration shown in FIG. 2A. The topographic structure of the bottom part of the microfluidic template **310**, which cannot be seen in the figure, is a mirror image of the top part, which can be seen in the figure. FIG. 3B schematically illustrates the cross-section of the microfluidic device shown in FIG. 3A and the operation principle of the device. The first window plate **351** and the second window plate **361** are bonded or attached with the microfluidic template **310** at the bonding areas **311** and **315** of the microfluidic template **310**. Bonding or attaching can be done by covalent or non-covalent methods. During a reaction involving the use of photogenerated reagents, a feed solution **331** containing photogenerated reagent precursor flows from an inlet **321** through an inlet restriction gap **322** into an illumination chamber **323**. After an exposure to hν in the illumination chamber **323**, active chemical reagents are produced and the resultant reactive solution **332** flows through a connection channel **324** into a reaction chamber **325**. In the reaction chamber **325** the reactive solution **332** is in contact with immobilized molecules **340** on the top surface **313** of the microfluidic template **310**. Chemical reactions take place between the active reagents in the reactive solution **332** and the immobilized molecules **340**. Then the solution flows through an outlet restriction gap **326** into the outlet **327** as an effluent **333**.

Please replace the paragraph beginning at page 16, line 11, with the following rewritten paragraph:

FIG. 4A illustrates an exploded perspective view of a high-density flowthrough multi-cell reactor device that embodies the two-level device configuration shown in FIG. 2A. FIG. 4B illustrates schematically the cross-section of the device shown in FIG. 4A. Compared to the device structure shown in FIG. 3A the device structure shown in FIG. 4A has a higher area density of the reaction chamber **425** and illumination chamber **423.** Inlet channel **421** and outlet channel **427** are embedded in the mid-section of the microfluidic template **410** so as to permit the upper and lower surface areas of the microfluidic template **410** to be fully utilized for implementing reaction and illumination chambers, respectively. During a reaction involving the use of photogenerated reagents, a feed solution **431** containing photogenerated reagent precursor flows from an inlet duct **422** into an illumination chamber **423.** After an exposure to hv in the illumination chamber **423** through the first window plate **451,** active chemical reagents are produced and the resulted reactive solution **432** flows through a connection channel **424** into a reaction chamber **425**. In the reaction chamber **425** the reactive solution **432** is in contact with immobilized molecules **441** and **442** on the top surface **413** of the microfluidic template **410** and the inner surface **462** of the second window plate **461,** respectively. Chemical reactions take place between the active reagents in the reactive solution **432** and the immobilized molecules **441** and **442**. Then the effluent **433** flows through an outlet duct **426** into the outlet channel **427**.

Please replace the paragraph beginning at page 28, line 4, with the following rewritten paragraph:

Target ~~nucleosides of~~ sequences 15 nucleotides long and complementary to the 5' ends of the probe sequences were chemically synthesized using standard phosphoramidite chemistry on a DNA synthesizer (Expedite 8909, manufactured by PE Biosystems, Foster City, CA 94404, USA). The targets were labeled with fluorescein at the 5' end. Hybridization was performed

using 50 to 100 n ~~molars~~ moles of the targets in 100 micro liters of 6XSSPE buffer solution (0.9 M NaCl, 60 mM Na_2HPO_4-NaH_2PO_4 (pH 7.2), and 6 mM EDTA) at room temperature for 0.5 to 1.0 hours followed by a wash using the buffer solution. A micro-pore-tube peristaltic pump was used to facilitate the solution circulation through the microfluidic array device during the hybridization and wash.